

## AMENDMENTS TO THE CLAIMS

- 5 Claim 1 (Currently amended) An extrusion-free wet cleaning process for post-etch  
 Cu-dual damascene structures, the process comprising:  
 providing a wafer comprising a silicon substrate and at least one post-etch Cu-dual  
 damascene structure, the post-etch Cu-dual damascene structure having a via  
 structure exposing a portion of a Cu wiring line electrically connected with an  
 10  $N^+$  diffusion region of the silicon substrate and a trench structure formed on the  
 via structure;  
executing an oxidation step by applying a diluted  $H_2O_2$  solution to the wafer to  
slightly oxidize the surface of the exposed Cu wiring line; and  
 15 washing away cupric oxide generated in the oxidation step by means of a cupric  
 oxide cleaning solution containing diluted HF,  $NH_4F$  or  $NH_2OH$  having a pH of  
above 7, and  
~~preventing Cu reduction reactions on the  $N^+$  diffusion region connected Cu wiring~~  
~~line.~~
- 20 Claim 2 (Original) The process of claim 1 wherein the Cu wiring line electrically  
 connected with an  $N^+$  diffusion region of the silicon substrate serves as a cathode in  
 the cupric oxide cleaning solution.
- 25 Claim 3 (Original) The process of claim 1 wherein the method of preventing Cu reduction  
 reactions on the Cu wiring line comprises purging inert gas onto the wafer during  
 the application to the wafer of the diluted  $H_2O_2$  solution.
- 30 Claim 4 (Original) The process of claim 1 wherein the method of preventing Cu reduction  
 reactions on the Cu wiring line comprises adding a Cu corrosion inhibitor to the  
 diluted  $H_2O_2$  solution.
- 35 Claim 5 (Original) The process of claim 4 wherein the Cu corrosion inhibitor comprises  
 benzotriazole (BTA).
- Claim 6 (Currently amended) The process of claim 1 wherein the method of preventing  
 Cu reduction reactions on the Cu wiring line comprises reducing the  $H_2O_2$   
 concentration of the diluted  $H_2O_2$  solution to below 100:1 (v/v) of solvent to  $H_2O_2$ .
- 40 Claim 7 (Original) The process of claim 1 wherein the method of preventing Cu reduction  
 reactions on the Cu wiring line comprises lowering the temperature of the diluted  
 $H_2O_2$  solution to below  $15^\circ C$  during the application to the wafer of the diluted  $H_2O_2$   
 solution.
- Claim 8 (Cancelled)

Claim 9 (Currently amended) A wet cleaning process comprising:

an oxidation step comprising a means for reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual damascene structure, wherein the means for reducing Cu deposition on a cathode-like copper wiring line comprises a step of purging an inert gas during the oxidation process; and  
an oxide etch step for washing away cupric oxide generated in the oxidation step by means of a cupric oxide cleaning solution; and  
~~reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual damascene structure.~~

Claim 10 (Original) The process of claim 9 wherein the oxidation step is used to slightly oxidize a surface of a Cu wiring line in a dual damascene structure by utilizing a diluted  $H_2O_2$  solution.

Claim 11 (Original) The process of claim 9 wherein the cupric oxide cleaning solution comprises diluted HF,  $NH_4F$ ,  $NH_2OH$ , or diluted HF/HCl.

Claim 12 (Original) The process of claim 9 wherein the oxide generated in the oxidation step comprises  $CuO_x$  and  $Cu(OH)_2$ .

Claim 13 (Original) The process of claim 9 wherein the cathode-like copper wiring line is electrically connected with an  $N^+$  diffusion region of a silicon substrate.

Claim 14 (Cancelled)

Claim 15 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises adding a Cu corrosion inhibitor to the diluted  $H_2O_2$  solution.

Claim 16 (Original) The process of claim 15 wherein the Cu corrosion inhibitor comprises benzotriazole (BTA).

Claim 17 (Currently amended) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises reducing the  $H_2O_2$  concentration of the diluted  $H_2O_2$  solution to below 100:1 (v/v) of solvent to  $H_2O_2$ .

Claim 18 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises lowering the temperature of the diluted  $H_2O_2$  solution during the oxidation step to below  $15^\circ C$ .

Claim 19 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises increasing the pH of the cupric oxide cleaning solution to above 7.